STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-81-R-1

Study No.: 451 **Title:** Evaluation of lake trout stocks in Lake Huron

Period Covered: October 1, 1999 to September 30, 2000

Study Objective: To determine stock parameters for lake trout in Lake Huron from index sampling.

Summary: Index sampling for lake trout in U.S. waters of Lake Huron was conducted with graded, large-mesh gill nets during the spring of 1999 and 2000 at 10 and 12 sites respectively. Four of these index sites have been sampled annually since the mid-1970s. The project design was modified in 1995 to accommodate more stations, as required for movement studies called for by the Great Lakes Fishery Commission, Lake Huron Technical Committee (LHTC). Annual mortality estimates from 1999 spring assessment catch curves were: 50% at MH-1 (9-Mile Point and Adams Point); 52% at MH-2 (Thunder Bay); 48% at MH-3 (Au Sable Point and Sturgeon Point); and 42% at MH-4,5 ("Thumb" area of south-central Lake Huron). Excessive mortality rates in northern and north-central Lake Huron appeared to preclude lake trout rehabilitation there. Mortality rates in the southern two statistical districts, on the other hand, were nearer but still above the 40% target level set by the LHTC. Currently, sea lamprey predation and commercial fishing are believed to be the leading causes of mortality, but recreational fishing harvest has been on the rise since 1993. Annual mortality attributable to sea lamprey for fish over 630 mm was estimated to range from 18% to 40%. Weight-length regressions and lake trout body condition were similar across statistical districts. Smelt and alewives comprised 99.1% of the spring diet in 1999.

Job 1. Title: Fish graded-mesh, experimental gill nets at assessment stations.

Findings: Six assessment stations were added to the study design in 1995, and two additional stations were added in 2000 to increase spatial coverage in northern Lake Huron. Therefore, a total of 10 assessment stations were sampled in 1999, and 12 stations were sampled in 2000. Lake trout marked with coded-wire tags are being stocked at each of four sites along the Michigan coastline; returns of the coded-wire tags will be used by the LHTC to document movements and will become the basis for delineation of lake trout management unit boundaries. The locations of assessment stations were designed to document distribution of these marked lake trout at and between the four stocking sites. Data from all assessment sites within each statistical district were combined for the purpose of estimating area stock parameters.

Survival–Age-specific catch per 305 m of gill net from the 1999 spring assessment, adjusted for stocking rate, was calculated for each of four statistical districts (Table 1). Mortality rates were estimated using the methods of Robson and Chapman (1961) for catch-at-age data (Table 2).

The assessment stations in MH-1 (northern Lake Huron) were Nine-Mile Point and Adams Point. A broader age distribution of lake trout was sampled in 1999 than in previous years, but catch (adjusted for stocking rates) declined sharply from ages 6-8 suggesting that few fish reached

maturity (Table 1). The mortality estimate for MH-1 was 50% (Table 2). This is above the LHTC target level of 45%, and total mortality is likely higher. The alternate-year stocking of 60,000 lake trout at Adams Point, with no stocking in other years, yielded an irregular catch curve. Total mortality for MH-1 has averaged 75% since 1982. This area, which includes waters deferred from lake trout rehabilitation by the 1985 consent decree, supports a tribal commercial fishery that averaged 150,000 pounds of lake trout landings per year from 1985 to 1999. One state-licensed, commercial-trap net operation also fishes MH-1. This operation cannot harvest lake trout, but an average of 8.8% of lake trout captured are killed as a result of this fisher's gear (MDNR unpublished data). Commercial fishing, along with high levels of sea lamprey predation, has nearly eliminated mature lake trout in MH-1. This conclusion is supported by recent stock assessment work done by the modeling subcommittee of the TFRC.

Three stations were netted in MH-2 (north-central Lake Huron): Presque Isle, Nordmeer, and South Point of Thunder Bay. The 1992-1995 lake trout year classes were strong in 1999 (Table 1). However, both catch and adjusted catch rates dropped dramatically after age 7 (Table 1). Swink (1990; 1991) reported that vulnerability of lake trout to sea lamprey attack increases sharply at about 635 mm in length. In 1999, lake trout from MH-2 averaged 610 mm at age 7 and 642 mm at age 8. Thus, the high losses of lake trout after age 7 in Thunder Bay may have been partly due to size-specific lamprey effects. Annual mortality since 1988 has ranged near or above the LHTC guideline of 40% (Table 2). There is no commercial fishery for lake trout in MH-2. The sport harvest in 1993 (Study 427) was less than 1,000 lake trout at Alpena and Rockport combined, but ranged from 2,091 to 12,992 during 1994-99. Until recently, lamprey-induced mortality has been the chief cause of the high mortality rates in MH-2, but sport harvest is now a significant source of mortality, especially on the older, mature fish that are targeted by the sport fishery. Average lakewide age of mature, female lake trout has been steadily declining since 1993, and is now at or below the age of first maturity for female lake trout. This lack of spawners will preclude lake trout rehabilitation in Lake Huron.

Two assessment sites were used to represent MH-3: Sturgeon Point and Au Sable Point. Mortality was lower than at the more northerly stations, but at 48% is still above the LHTC target level of 40% (Table 2). Like MH-2, there was a sharp decline in catch rate for fish older than age 7 (Table 1).

Assessment sites in MH-4,5 ("Thumb" area) were at Grindstone City, Harbor Beach north, and Harbor Beach south. Survey catch rates and number of age groups sampled here have consistently been higher than in the north and, therefore, have allowed more accurate estimation of survival. Mortality rates for this area have remained much lower than in the north. In 1999, the mortality estimate was 42%, which was near the 40% LHTC target level (Table 2).

Offshore stocking began at all sites in 1989 and 1990, and this may have increased apparent survival of more recent year classes, which in turn, would increase apparent mortality (by violating the assumption of equal recruitment rates over time).

Chemical control of Sea lamprey began in 1998 on the St. Marys River. Because most sea lamprey are believed to originate there, the St. Marys treatment is expected to significantly enhance lake trout survival, particularly in northern Lake Huron. In anticipation of this effect, the Lake Huron Committee resumed stocking lake trout in some of the northern grids of Lake Huron in 1998. With increasing recreational and commercial harvest, further regulation of fishing will be required to attain target survival levels. The Year-2000 Consent Decree recently signed by the state of Michigan, the federal government, and 5 Chippewa/Ottawa tribes limits

commercial harvest of lake trout and stipulates new recreational size limits in MH-1 and MH-2. Similar regulations are needed for southern Lake Huron to control lake trout mortality.

Movement–In 1992, the LHTC initiated a lake trout movement study with the stocking of 60,000 coded-wire-tagged lake trout at each of 4 sites: Adams Point, Middle Island, Sturgeon Point, and Point aux Barques. Sixty thousand coded-wire-tagged lake trout were annually planted at each of the four sites in 1994, 1996, and 1998. In addition, coded-wire-tagged lake trout have been stocked at Drummond Island and 6-Fathom Bank since 1985. To capture information on distribution of these marked fish, we increased the number of stations along the Michigan shore of Lake Huron such that one station was at each stocking site and other stations were located equal distances between them.

Tagged lake trout originating from all research stocking sites were represented in each year's samples from 1995 through 1999 (Table 3). Although some lake trout had moved considerable distances, there was a tendency for those lots stocked from Sturgeon Pt. south to be sampled in the south and those stocked north of Sturgeon Pt. to be found at the northern stations (Table 3). A total of 747 coded-wire-tagged lake trout have been taken in this assessment since 1995 (Table 3). This sample size indicates the number of marked fish and the survey effort deployed were both adequate to meet study objectives. One hundred forty-eight lake trout stocked at 6-Fathom Bank were taken at the near-shore sites (39 in 1995, 42 in 1996, 19 in 1997, 21 in 1998, and 26 in 1999), and they appeared at all 10 stations (Tables 3 and 4). Stockings at 6-Fathom have been equally divided between three lake trout strains. However, for fish age-7 and older, nearly 2.5 times as many Seneca strain were taken at the near-shore sites than the other two strains combined (Table 4). Assessment nettings by the United States Geological Survey on 6-Fathom Bank have likewise found that Seneca strain composes the majority of older fish on this mid-lake reef.

A more in-depth analysis of lake trout movements based on coded-wire-tag data was conducted as part of the stock assessment modeling done by the modeling technical subcommittee of the TFRC for the 2000 Consent Decree negotiations. In 1998, the LHTC designed a common lake trout coded-wire-tag data base for Lake Huron that contained data from Michigan Department of Natural Resources (MDNR), United States Fish and Wildlife Service (USFWS), United States Geological Survey Biological Resource Division (BRD), Chippewa/Ottawa Treaty Fishery Management Authority (COTFMA), and Ontario Ministry of Resources (OMNR). I worked with the USFWS to analyze the common database and determine the extent of lakewide lake trout movement. These movement data were developed into a lakewide movement matrix that was included in the TFRC stock assessment modeling.

Lamprey wounding–Lamprey-induced mortality was estimated using rates of A1-A3 wounds (King and Edsall 1979) from spring assessment netting, survival rates from laboratory studies by Swink (1990), and the equation (Koonce and Pycha unpublished):

$$ZL=W(1-P)/P$$

where ZL = instantaneous lamprey-induced mortality, W = the number of A1-A3 type wounds per lake trout, and P = probability of surviving a single lamprey attack.

The annual mortality rate for lake trout attributable to lamprey ranged from 18% to 40% for lake trout over 630 mm in 1999 (Table 5). Indexing of lamprey wounding on lake trout requires large samples of fish larger than 535 mm. Unfortunately, few lake trout of larger size groups were available from spring assessments at MH-1. The high loss to lamprey, in combination with

natural mortality, leaves little, if any, surplus production for harvest in any of the Lake Huron statistical districts. Wounding generally increased with host size and was most pronounced in fish over 630 mm (Table 5). This pattern is consistent with laboratory observations of Swink (1991).

Growth–Parameters of weight-length regressions and condition factors for the assessment stations were fairly similar across statistical districts in 1999 (Table 6), suggesting uniform lake trout body condition across statistical districts. Average total length at age five followed a north-south gradient for the Michigan assessment stations (Table 7), likely reflecting the colder, less productive conditions of northern Lake Huron.

Food habits–The stomach contents of all gill-netted lake trout were examined, and a sub-sample of stomach contents was brought back to the lab to obtain lengths and weights of individual prey items. A summary of stomach contents from 1999 spring index netting is given in Table 8. As with past years, smelt and alewives comprised the majority (99.1%) of the diet lakewide. Alewives were the dominant prey in MH-2 and MH-4,5, while smelt were the dominant prey in MH-1 and MH-3. Average weights of prey items are also given (where possible) in Table 8. Approximately 11% of the lake trout sampled in 1999 had void stomachs (Table 8). This is near the long-term average (12.7%) of void stomachs in the spring lake trout survey. In 1998, the percent of void stomachs reached an all time high of 27.7%, but a strong 1998 year class of alewives bolstered the 1999 forage base.

Job 2. Title: Net for adults on spawning reefs.

Findings: No spawning reefs were netted in 1999 due to commitments to the TFRC modeling team.

Job 3. Title: Analyze field data and coordinate with other agencies. Participate in interagency planning and management of lake trout.

Findings: I designed a new lake trout database for the Alpena Station. The database is relational (Microsoft ACCESS software) and includes all spring and fall gill-netting data from 1970 to 1999. Formats of all fields were standardized and made uniform over the entire time series. I also added lake trout coded-wire-tag stocking data so that lake trout movement could be more easily assessed. Most data were also converted to ArcView format for GIS analysis. We prepared analyses for the coordinated interagency studies of the LHTC, presented lake trout status reports at the annual Upper Lakes meetings, presented a rehabilitation status report to the Great Lakes Fishery Commission Board of Technical Experts task area meeting, and presented lake trout population dynamics to the Lake Huron Fisheries Advisory Committee. I also attended the summer and winter Lake Huron Technical Committee meetings where updates on lake trout progress and technical reports were presented. I am also a member of the TFRC Modeling Technical Subcommittee and compiled Lake Huron lake trout biological data, coded wire tag movement data, and guided lake trout stock assessment model development for Lake Huron. We designed 1999 and 2000 stocking plans for Lake Huron and began work on long-term stocking strategies in conjunction with the Year-2000 Consent Decree.

Job 4. Title: Write annual and final reports.

Findings: The required reports and documents were completed as scheduled.

Job 5. Title: Trawl for age-0 wild lake trout in Thunder Bay and monitor for other evidence of lake trout reproduction.

Findings: Trawling was completed as scheduled at the annual index station near North Point of Thunder Bay. A semi-balloon otter trawl with a 23-m bridle, 11-m foot rope, and 13-mm mesh (stretch measure) cod-end liner was used to sample age-0 lake trout. Age-0 wild lake trout were taken in bottom trawls every year at the North Point station from 1986 through 2000, but the catch decreased to the lowest levels of the study during 1995-2000 (Table 9).

The number of unclipped lake trout at spring assessment stations has been used as another index of reproduction. The contribution of unclipped, potentially wild, lake trout to the assessment catch in MH-2 was 10-18% for the 1984, 1985, and 1986 year classes (Johnson and VanAmberg 1995). In 1999, however, the contribution of unclipped fish, averaged over all year classes, was only 1.3%, 2.3%, 2.2%, and 3.2% for MH-1, 2, 3, and 4,5 respectively. There was no evidence that unclipped fish composed a larger than expected proportion of any one year class. Although reproduction continues, its contribution to the fishery is almost too weak to be measurable.

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Robson, D. S. and D. G. Chapman. 1961. Catch curves and mortality rates. Transactions of the American Fisheries Society 90:181-189.

Swink, W. D. 1991. Host size selection by parasitic sea lampreys. Transactions of the American Fisheries Society 120:637-643.

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Table 1.–Annual age-specific lake trout catch, adjusted for stocking and effort (per 305 m of net), by statistical district, Michigan waters of Lake Huron, 1999.

Age	Year class	Effective # stocked	Stocking adjustment factor[1]	Count	Catch per 305 m	Adjusted CPE[2]
MH-1: Effort=6,860 m[3]						
2	1997	277,579	1.80	20	0.89	1.60
3	1996	182,190	2.74	7	0.31	0.85
4	1995	189,241	2.64	97	4.31	11.39
5	1994	167,485	2.99	31	1.38	4.11
6	1993	97,681	5.12	48	2.13	10.92
7	1992	279,149	1.79	27	1.20	2.15
8	1991	342,635	1.46	4	0.18	0.26
9	1990	336,570	1.49	0	0.00	0.00
10	1989	234,304	2.13	0	0.00	0.00
11	1988	166,592	3.00	1	0.04	0.13
MH-2: Effort=3,017 m						
3	1996	311,571	1.60	2	0.20	0.32
4	1995	251,881	1.99	44	4.45	8.83
5	1994	279,396	1.79	101	10.21	18.27
6	1993	428,213	1.17	137	13.85	16.17
7	1992	456,148	1.10	86	8.69	9.53
8	1991	540,027	0.93	19	1.92	1.78
9	1990	536,099	0.93	3	0.30	0.28
10	1989	261,196	1.91	0	0.00	0.00
11	1988	405,860	1.23	1	0.10	0.12
MH-3: Effort=3,840 m						
3	1996	241,845	2.07	6	0.48	0.99
4	1995	200,189	2.50	28	2.22	5.55
5	1994	252,195	1.98	106	8.42	16.69
6	1993	230,338	2.17	129	10.25	22.24
7	1992	281,831	1.77	70	5.56	9.86
8	1991	256,791	1.95	17	1.35	2.63
9	1990	252,375	1.98	5	0.40	0.79
10	1989	214,012	2.34	0	0.00	0.00
11	1988	272,080	1.84	1	0.08	0.15
12	1987	246,643	2.03	1	0.08	0.16
MH-4, 5: Effort=4,390 m						
4	1995	371,279	1.35	14	0.97	1.31
5	1994	421,577	1.19	59	4.10	4.86
6	1993	604,383	0.83	152	10.56	8.74
7	1992	505,941	0.99	88	6.11	6.04
8	1991	490,537	1.02	30	2.08	2.12
9	1990	482,057	1.04	1	0.07	0.07
10	1989	313,815	1.59	1	0.07	0.11
11	1988	493,809	1.01	1	0.07	0.07
12	1987	266,928	1.87	0	0.00	0.00
13	1986	270,572	1.85	1	0.07	0.13

[1] Adj. factor = 500,000/no. stocked.

[2] Adj. CPE = catch/305m x adj. factor

[3] Alternate-yr stocking on survey site with no stocking in years caused irregular catch curve other

Table 2.–Mortality rates (%) from spring gill net assessments, Michigan waters of Lake Huron, 1982-99.

Year	North (MH-1)	N. Central (MH-2)	Central (MH-3)	"Thumb" (MH-4,5)
1982-86 (average)	76	49	42	28
1986-87	87	NA	NA	36
1987-88	76	NA	43	40
1988-89	89	52	43	37
1989-90	NA	52	47	46
1990-91	>70	35	43	31
1991-92	>70	42	48	27
1992-93	>70	69	62	28
1993-94	>70	55	51	32
1994-95	74	52	49	37
1995-96	81	55	54	53
1996-97	>80	58	45	37
1997-98	78	56	44	46
1998-99	50[1]	52	48	42

[1] Alternate year stocking on survey site with no stocking in other years caused irregular catch curve.

Table 3.–Total gill net catch and catch per effort (number per 3,050 m of net) of coded-wire-tagged lake trout at 10 near-shore Michigan stations in Lake Huron, spring, 1995-99.

	Survey station and effort (combined 1995-1999 m of net in parenthesis)										
	S. Harbor Beach (7,133)	N. Harbor Beach (7,682)	Grindstone (5,489)	AuSable Pt. (8,504)	Sturgeon Pt. (8,230)	Thunder Bay (7,407)	Nordmeer (7,133)	Presque Isle (6,859)	Adams Pt. (10,456)	Nine-mile Pt. (22,496)	Total by stocking site
Catch by stocking site:											
Drummond Island	0	0	0	0	1	1	5	4	7	5	23
Adams Pt.	1	1	5	3	2	12	24	20	98	31	197
Middle Island	0	0	4	7	6	11	50	34	37	9	158
Six-Fathom	10	11	25	11	19	9	39	5	15	4	148
Sturgeon Pt.	6	5	13	15	21	19	17	6	2	2	106
Pt. Aux Barques	12	27	47	11	6	5	4	3	0	0	115
Total by station	29	44	94	47	55	57	139	72	159	51	747
Catch/3,050 m by stocksite:											
Drummond Island	0.00	0.00	0.00	0.00	0.37	0.41	2.14	1.78	2.04	0.68	7.42
Adams Pt.	0.43	0.40	2.78	1.08	0.74	4.94	10.26	8.89	28.59	4.20	62.31
Middle Island	0.00	0.00	2.22	2.51	2.22	4.53	21.38	15.12	10.79	1.22	59.99
Six-Fathom	4.28	4.37	13.89	3.95	7.04	3.71	16.68	2.22	4.38	0.54	61.06
Sturgeon Pt.	2.57	1.99	7.22	5.38	7.78	7.82	7.27	2.67	0.58	0.27	43.55
Pt. Aux Barques	5.13	10.72	26.12	3.95	2.22	2.06	1.71	1.33	0.00	0.00	53.24
Total	12.41	17.48	52.23	16.87	20.37	23.47	59.44	32.01	46.38	6.91	

Table 4.–Age composition, by strain, of coded-wire-tagged lake trout stocked on 6-Fathom Bank, Lake Huron and sampled at 10 nearshore stations, spring gill netting, 1995-1999.

	Strain														
	Seneca/Ontario					Marquette					Jenny/Lewis				
	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	1	0	1	0	0	3	0	0	1	1	0
4	1	1	0	0	1	4	3	0	1	4	5	1	1	0	0
5	2	3	3	1	1	2	3	1	1	3	1	4	2	3	2
6	6	2	1	2	0	3	5	0	1	3	0	3	1	4	2
7	0	2	0	1	0	1	1	1	2	2	0	2	0	0	0
8	5	1	3	0	0	1	0	0	0	1	0	0	0	1	1
9	6	5	0	0	0	0	2	1	1	0	1	0	0	0	0
10	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
11	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0
12	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Totals	21	16	11	6	5	11	16	3	6	16	7	10	5	9	5
Age >= 7	12	10	7	3	2	2	4	2	3	3	1	2	0	1	1

Table 5.–Estimated mortality attributable to sea lamprey attacks, Lake Huron, 1998-99, based on wounding rates measured in 1999.

Length group (mm)	Probability of survival	Marks per fish (M)	Sample size (N)	Lamprey instantaneous (ZL)	Annual lamprey (AZ)
MH-1: Drummond Island to Rogers City (combined DNR & COTFMA)					
430-529	0.35	0.073	122	0.14	0.13
530-629	0.45	0.131	84	0.16	0.15
630-734	0.45	0.000	12	0.00	0.00
735+	0.55	0.248	4	0.20	0.18
MH-2: North-Central					
430-529	0.35	0.038	80	0.07	0.07
530-629	0.45	0.205	229	0.25	0.22
630-734	0.45	0.333	69	0.41	0.33
735+	0.55	0.000	0	---	---
MH-3,4,5: "Thumb" & Central					
430-529	0.35	0.029	102	0.05	0.05
530-629	0.45	0.148	432	0.18	0.17
630-734	0.45	0.287	157	0.35	0.30
735+	0.55	0.625	8	0.51	0.40

Table 6.–Condition factors, weight-length regressions at assessment stations, and estimated weight (g) at 600 mm total length from 1999 index netting in Michigan waters of Lake Huron.

Statistical District	Area	Ktl @600 mm	a intercept	b slope	R squared	Wt (gm) @600 mm
MH-1	North	1.020	6.1E-06	3.081	0.985	2204
MH-2	North Central	1.051	9.5E-06	3.015	0.951	2270
MH-3	Central	1.064	7.8E-06	3.048	0.944	2298
MH-4,5	"Thumb"	1.054	1.3E-05	2.967	0.926	2277

$Ktl=(W/L^3)*10^5$
Length-weight regression: $W=aL^b$

Table 7.–Mean total lengths (mm) at age-5 of lake trout sampled from 5 statistical districts of Lake Huron, 1999.

Statistical district	Mean	Standard deviation	N
MH-1	539	45	31
MH-2	551	51	101
MH-3	558	40	105
MH-4,5	560	42	59

Table 8.–Lake trout stomach contents (number consumed, % of total identifiable prey, and average weight of prey) by statistical districts in Lake Huron from MDNR 1999 assessments. Sample sizes for prey weights are in parentheses.

	MH-1			MH-2			MH-3			MH-4, 5			Total		
Prey	No.	%	Avg. weight (g)	No.	%	Avg. weight (g)	No.	%	Avg. weight (g)	No.	%	Avg. weight (g)	No.	%	Avg. weight (g)
Alewife	175	31.9	2.5 (53)	1513	58.9	2.6 (608)	1051	38.8	3.0 (248)	2820	87.0	4.3 (727)	5559	61.3	3.4 (1636)
Smelt	355	64.7	4.7 (270)	1045	40.7	4.4 (471)	1634	60.3	4.9 (84)	393	12.1	2.0 (207)	3427	37.8	4.1 (1032)
Slimy sculpin	10	1.8	1.8 (2)	0	0.0	---	1	0.04	---	0	0.0	---	11	0.1	1.8 (2)
9-spine stickleback	2	0.4	---	0	0.0	---	23	0.8	1.6 (3)	0	0.0	---	25	0.3	1.6 (3)
3-spine stickleback	1	0.2	0.3 (1)	1	0.04	0.9 (1)	1	0.04	---	0	0.0	---	3	0.03	0.6 (2)
Lake whitefish	2	0.4	---	6	0.2	---	0	0.0	---	2	0.06	17.5 (2)	10	0.1	17.5 (2)
Bloater chub	1	0.2	---	0	0.0	---	0	0.0	---	0	0.0	---	1	0.01	---
Round goby	0	0.0	---	0	0.0	---	0	0.0	---	25	0.8	---	25	0.3	---
Trout perch	0	0.0	---	0	0.0	---	1	0.04	---	1	0.03	---	2	0.02	---
Terrestrial insects	2	0.4	0.2 (2)	2	0.08	1.9 (2)	0	0.0	---	1	0.03	0.1 (1)	5	0.06	0.8 (5)
Total identifiable	548	100		2567	100		2711	100		3242	100		9068	100	
Unidentifiable fish	91	---		172	---		101	---		218	---		582	---	
Void	58	24.7		42	10.7		31	8.6		21	6.2		152	11.4	
Number examined	235			391			361			341			1328		

Table 9.–Trawl catch of age-0 lake trout from Thunder Bay, Lake Huron, 1984-2000.

	North Point			Mischley Reef			Black River		
Year	Tows	Catch	CPE	Tows	Catch	CPE	Tows	Catch	CPE
1984	0	---	---	0	---	---	13	9	0.69
1985	8	0	0.00	0	---	---	2	2	1.00
1986	19	41	2.16	0	---	---	0	---	---
1987	23	19	0.83	0	---	---	0	---	---
1988	33	43	1.30	0	---	---	0	---	---
1989	63	39	0.62	0	---	---	0	---	---
1990	54	44	0.81	0	---	---	24	0	0.00
1991	39	6	0.15	0	---	---	0	---	---
1992	36	7	0.19	6	1	0.17	0	---	---
1993	35	13	0.37	11	1	0.09	0	---	---
1994	36	21	0.81	4	2	0.50	3	0	0.00
1995	36	4	0.11	0	---	---	0	---	---
1996	36	2	0.06	0	---	---	0	---	---
1997	48	5	0.10	0	---	---	0	---	---
1998	40	3	0.08	0	---	---	0	---	---
1999	38	2	0.05	0	---	---	0	---	---
2000	36	1	0.03	0	---	---	0	---	---